STIC Search Report
EIC 2800

STIC Database Tracking Number: 154

TO: Tamiko Bellamy **Location: JEFF 8D24** **Art Unit: 2856** **Wednesday, October 26, 2005** **Case Serial Number: 10/823706**	**From: Michael Obinna** **Location: STIC-EIC2800** **Jefferson Building RM 4A58** **Phone: 571-272-2663** **Email: michael.obinna@uspto.gov**

Search Notes

RE: **Capacitance accelerometer having a compensation electrode**

Examiner Bellamy,

Attached are edited search results from the patent and non-patent databases.

The tagged items are some of the results worth your review. However, I recommend that you browse all the results.

If you would like more searching to be done on this case, or if you have questions or comments, please do not hesitate to contact me.

Respectfully,

Michael Obinna

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     (FILE 'HOME' ENTERED AT 17:12:49 ON 26 OCT 2005)

     FILE '1MOBILITY, 2MOBILITY' ENTERED AT 17:13:03 ON 26 OCT 2005
                SET PLU ON PERM
L1           739 SEA ABB=ON  PLU=ON  ACCELEROMETER OR VIBROMETER OR GRAVIMETER
                OR MEMS
L2            65 SEA ABB=ON  PLU=ON  COMPAR#####(3N) CAPACIT#####
L3            13 SEA ABB=ON  PLU=ON  (MOVABLE OR MOBIL####)(3N)(ELECTRODE OR
                SENSOR OR PROBE OR CONDUCTOR)
L4            53 SEA ABB=ON  PLU=ON  (FIXED OR STATIONARY OR IMMOBILE OR RIGID
                OR STATIC)(3N)(ELECTRODE OR SENSOR OR PROBE OR CONDUCTOR)
L5           717 SEA ABB=ON  PLU=ON  FINGER OR COMBSHAPE OR COMB(W) SHAPE OR
                COMB OR PROJECTION
L6             6 SEA ABB=ON  PLU=ON  COMPENSAT####(5N) CAPACIT######
L7             0 SEA ABB=ON  PLU=ON  L1 AND L6
L8             0 SEA ABB=ON  PLU=ON  L1 AND L2 AND L3 AND L4
L9             1 SEA ABB=ON  PLU=ON  L1 AND L3 AND L4
L10            5 SEA ABB=ON  PLU=ON  L1 AND L5
L11            1 SEA ABB=ON  PLU=ON  L1 AND L2
                D L9 IBIB ABS
                D L10 1-5 IBIB ABS
                D L11 IBIB ABS
```

L9 ANSWER 1 OF 1 1MOBILITY COPYRIGHT 2005 SAE on STN
ACCESSION NUMBER: 91:235 1MOBILITY
DOCUMENT NUMBER: 910274
TITLE: Semiconductor capacitance-type **accelerometer** with PWM electrostatic servo technique
AUTHOR: Suzuki, Seiko(Hitachi Research Lab., Hitachi Ltd.); Tuchitani, Shigeki(Hitachi Research Lab., Hitachi Ltd.); Sato, Kazuo(Central Research Lab., Hitachi Ltd.); Naito, Shotaro(Sawa Works, Hitachi Ltd.); Ueno, Sadayasu(Sawa Works, Hitachi Ltd.); Suzuki, Masayosi(Sawa Works, Hitachi Ltd.); Ichikawa, Norio(Sawa Works, Hitachi Ltd.); Sato, Masayuki(Sawa Works, Hitachi Ltd.)
SOURCE: (1991) . Published by Society of Automotive Engineers, Inc., Warrendale, Pennsylvania (USA). Also published in: P-242.
Meeting Info.: SAE International Congress and Exposition. Detroit, Michigan, USA. 1991 Feb 25 - 1991 Mar 01.
PUB. COUNTRY: United States
DOCUMENT TYPE: Conference Article; (Technical Paper)
FILE SEGMENT: SAE
LANGUAGE: English

AB A semiconductor capacitance-type **accelerometer** utilizing a pulse width modulation (PWM) electrostatic servo technique has been developed. Highly accurate detection of very small and low frequency acceleration became possible with the PWM sensing method. The limited air gaps between the **movable** and **fixed electrodes** ensured compatibility between high sensitivity and durability, while transverse sensitivity and temperature coefficient were reduced due to the symmetric structure of the sensing device. This sensor has been designed for the measurement range of 0 to ±1g, ±2g and 0 to 50Hz. The **accelerometer** is composed of two chips: the sensing device made by silicon micromachining technology and the custom IC made by bipolar CMOS technology.
In this paper, we present the fundamental sensing principle, the sensing device, the custom IC and the characteristics of the new **accelerometer**.

L10 ANSWER 4 OF 5 1MOBILITY COPYRIGHT 2005 SAE on STN
ACCESSION NUMBER: 96:1284 1MOBILITY
DOCUMENT NUMBER: 960758
TITLE: Acceleration sensor in surface micromachining for airbag applications with high signal/noise ratio
AUTHOR: Offenberg, M.(Robert Bosch GmbH); Munzel, H.(Robert Bosch GmbH); Schubert, D.(Robert Bosch GmbH); Schatz, O.(Robert Bosch GmbH); Larmer, F.(Robert Bosch GmbH); Muller, E.(Robert Bosch GmbH); Maihofer, B.(Robert Bosch GmbH); Marek, J.(Robert Bosch GmbH)
SOURCE: (1996 Feb) . Society of Automotive Engineers, Inc., Warrendale, Pennsylvania, USA. Also published in: SP-1133. Meeting Info.: SAE International Congress and Exposition. Detroit, Michigan, USA. 1996 Feb 26 - 1996 Feb 29.
PUB. COUNTRY: United States
DOCUMENT TYPE: Conference Article; (Technical Paper)
FILE SEGMENT: SAE
LANGUAGE: English

AB Employing novel surface micromachining techniques, a highly miniaturized, robust device has been fabricated. The **accelerometer** fulfills all requirements of state-of-the art airbag systems. The present paper reports on the manufacturing and assembly process as well as the performance of the sensor.

The capacitive sensing element consists of a moveable proof mass of polysilicon on a single crystalline silicon substrate. A lateral acceleration displaces the proof mass and a capacitive signal is generated at a **comb** electrode configuration. An external IC circuit provides the signal evaluation and conditioning in a closed loop mode, resulting in low temperature dependency of sensor characteristics and a wide frequency response.

The sensor is fabricated by standard IC processing steps combined with additional surface micromachining techniques. A special deposition process in an epitaxial reactor allows the fabrication of moveable masses of more than 10 μm thickness.

As a result, working capacitances are up to 10 times higher as compared with conventionally fabricated surface micromachined **accelerometers**. Measurement ranges of 50gn with mgn resolution have been realized.

Secondly, the larger thickness results in an increased mechanical stiffness of the mechanical structure normal to the water surface. Hence, cross sensitivities of this sensing element are reduced by more than one order of magnitude. Also, fewer problems are encountered with the more rugged sensor structure during mounting and encapsulation.

10/25/2005 4:07:48 PM

[File 342] Derwent Patents Citation Indx 1978-05/200567

pn=**US 6318174**
S1 1 S PN=US 6318174

map pn/ct=

SearchSave "SC094" stored
1 Select Statement, 1 Search Term(s)
SearchSave SC094

1 SearchSave(s), 1 Search Term(s)

map pn

SearchSave "SC095" stored
1 Select Statement, 6 Search Term(s)
SearchSave SC095

1 SearchSave(s), 6 Search Term(s)

[File 344] Chinese Patents Abs Aug 1985-2005/May
[File 347] JAPIO Nov 1976-2005/Jun(Updated 051004)
[File 350] Derwent WPIX 1963-2005/UD,UM &UP=200568

Set	Items	Description
S1	2	PN=FI 200300338 + PN=FR 2858853 + PN=US 2004226374 + PN=US 6938485 + PN=WO 200479373 + PN=WO 200517537 FROM 344, 347, 350

10/25/2005 4:07:48 PM

[File 342] Derwent Patents Citation Indx 1978-05/200567

s pn=US 5911157
S1 1 S PN=US 5911157

map pn/ct=

SearchSave "SC096" stored
1 Select Statement, 5 Search Term(s)
SearchSave SC096

1 SearchSave(s), 5 Search Term(s)

map pn

SearchSave "SC097" stored
1 Select Statement, 13 Search Term(s)
SearchSave SC097

[File 344] Chinese Patents Abs Aug 1985-2005/May
[File 347] JAPIO Nov 1976-2005/Jun(Updated 051004)
[File 350] Derwent WPIX 1963-2005/UD,UM &UP=200568

Set	Items	Description
S1	5	PN=DE 69523475 + PN=DE 69616706 + PN=EP 1083431 + PN=EP 762133 + PN=EP 800651 + PN=JP 11500528 + PN=JP 2001133478 + PN=JP 3654905 + PN=US 5596144 + PN=US 5939632 + PN=US 6367786 + PN=US 6546799 + PN=WO 9621157 FROM 344, 347, 350

1/9/3 (Item 2 from file: 350) **Links**
Derwent WPIX

013790855 **Image available**
WPI Acc No: 2001-275066/200129
XRPX Acc No: N01-196602

Compensating position offset of a capacitive inertial sensor used in airbag actuation system of motor vehicle for measuring deceleration upon impact

Patent Assignee: STMICROELECTRONICS SRL (SGSA)
Inventor: CINI D; GOLA A; VIGNA B; ZERBINI S
Number of Countries: 027 Number of Patents: 003
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
EP 1083431	A1	20010314	EP 99830568	A	19990910	200129	B
JP 2001133478	A	20010518	JP 2000274207	A	20000908	200133	
US 6546799	B1	20030415	US 2000658294	A	20000908	200329	

Priority Applications (No Type Date): EP 99830568 A 19990910
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
EP 1083431	A1	E	11	G01P-015/125	
	Designated States (Regional): AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI				
JP 2001133478	A		8	G01P-015/125	
US 6546799	B1			G01P-015/00	

Abstract (Basic): EP 1083431 A1

NOVELTY - Integral micro-actuator (24) of an inertial sensor (1') has four actuator groups (26), each formed of several actuation elements (28) comprising a mobile arm (30), which is integral with a mobile mass (6) of the rotor and carries mobile electrodes (32) extending in a circumferential direction. Fixed arms (34,36) also extending radially are biased at 1.5-5.0 volts so that the rotor is moved to compensate for its position offset.

DETAILED DESCRIPTION - AN INDEPENDENT CLAIM is included for an inertial sensor.

USE - Compensating position offset of a capacitive inertial sensor.

ADVANTAGE - No interference between capacitive elements of rotor and stator.

DESCRIPTION OF DRAWING(S) - Drawing shows a schematic representation of the sensor.

Suspended mass (6)
Micro-actuator (24)
Actuator groups (26)
Actuation elements (28)
Mobile arm (30)
Mobile electrodes (32)
Fixed arms (34,36)
pp; 11 DwgNo 3/5

10/26/2005 2:04:41 PM

[File 2] INSPEC 1898-2005/Oct W3
[File 81] MIRA - Motor Industry Research 2001-2005/Sep
[File 63] Transport Res(TRIS) 1970-2005/Aug

Set	Items	Description
S1	40925	S ACCELEROMETER? ? OR ACCELERAT????(2N)(SENS???? OR MEASUR?????) OR MEMS OR MICROMACHINE? ? OR MICROELECTROMECHANICAL? ? OR MICRO()ELECTROMECHANICAL? ? OR MICROELECTRO()MECHANICAL? ? OR MICRO()MECHANICAL? ? OR MICROMECHANICAL? ? OR VIBROMETER? ? OR VIBRO()METER? ? OR VIBRAT????(2N)(MEASUR???? OR SENS????) OR GRAVIMETER? ?
S2	43484	S CAPACITANCE(3N)MEASUR???? OR ELECTRIC(2N)(CAPACIT???? OR REACTANCE? ?) OR CAPACIT????(2N)STOR???? OR SUPERCAPACITANCE? ? OR SUPER()CAPACITANCE OR INDUCTANCE? ?
S3	2107865	S COMPENSAT???? OR CORRECT??? OR ADJUST???? OR ERROR()CORRECT???? OR RECALIBRAT???? OR REGULAT???? OR COMPAR???? OR PRECISION OR DIFFERENTIAT???? OR ERROR? ?
S4	15011	S (MOVABLE OR MOTIL???? OR MOBIL???? OR MOTIVE OR MOTILE OR ACTIV???? OR AGITAT???)(3N)(ELECTRODE? ? OR CONDUCT???? OR ROD? ? OR ANODE? ? OR CATHODE? ? OR PROB??? OR SENS????)
S5	18120	S (FIXED OR STATIONARY OR IMMOV???? OR IMMOB???? OR STATIC???? OR MOTIONLESS OR RIGID??? OR STABLE OR PERMANENT OR IMMOTIL?????)(3N)(ELECTRODE? ? OR CONDUCT???? OR ROD? ? OR ANODE? ? OR CATHODE? ? OR PROB??? OR SENS????)
S6	33907	S (COMPENSAT???? OR CORRECT??? OR ADJUST???? OR ERROR()CORRECT???? OR RECALIBRAT???? OR REGULAT???? OR COMPAR???? OR PRECISION OR DIFFERENTIAT???? OR ERROR? ?)(3N)(ELECTRODE? ? OR CONDUCT???? OR ROD? ? OR ANODE? ? OR CATHODE? ? OR PROB??? OR SENS????)
S7	544007	S FINGER???? OR COMBSHAPE? ? OR COMB()SHAPE? ? OR INTERCALAT???? OR INSERT????()BETWEEN OR COMB? ? OR FORK()SHAPE OR PROJECT???? OR FORK? ? OR COMBLIKE OR COMB()LIKE OR FORKLIKE OR FORK()LIKE OR ARM? ? OR EXTENSION? ?
S8	2	S S1 AND S2 AND S4 AND S5
S9	2793	S S1 AND S7
S10	6	S S9 AND S4 AND S5
S11	608	S S1 AND S6
S12	1	S S11 AND S4 AND S5
S13	24	S S11 AND S4
S14	21	S S13 AND PY<=2003
S15	12174	S S2 AND S3
S16	100	S S15 AND S1
S17	0	S S16 AND S4 AND S5
S18	4	S S16 AND S4
S19	0	S COMPAR????()INITIAL()CAPACITANCE
S20	721	S COMPAR????(3N)CAPACITANCE? ?
S21	10	S S20 AND S1
S22	7	S S21 AND PY<=2003
S23	4	S S10 NOT S8
S24	1	S S12 NOT (S8 OR S10)
S25	4	S S18 NOT (S8 OR S10 OR S12)
S26	7	S S22 NOT (S8 OR S10 OR S13 OR S18)
S27	19	S S14 NOT (S8 OR S10 OR S18 OR S22)

10/823 706

26/9/5 (Item 5 from file: 2) Links
INSPEC

06769499 **INSPEC Abstract Number:** A9802-0630G-001, B9801-7230-067
Title: High G MEMS integrated accelerometer
Author Davies, B.R.; Craig Barron, C.; Montague, S.; Smith, J.H.; Murray, J.R.; Christenson, T.R.; Bateman, V.I.
Author Affiliation: Dept. of Integrated Micromech., Microsenors, & CMOS Technol., Sandia Nat. Labs., Albuquerque, NM, USA
Journal: Proceedings of the SPIE - The International Society for Optical Engineering **Conference Title:** Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3046 p. 52-62
Publisher: SPIE-Int..Soc. Opt. Eng ,
Publication Date: 1997 **Country of Publication:** USA
CODEN: PSISDG **ISSN:** 0277-786X
SICI: 0277-786X(1997)3046L.52:HMIA;1-H
Material Identity Number: C574-97207
U.S. Copyright Clearance Center Code: 0277-786X/0277-786X/97/$10.00
Conference Title: Smart Structures and Materials 1997: Smart Electronics and MEMS
Conference Sponsor: SPIE; SEM; ASME
Conference Date: 4-6 March 1997 **Conference Location:** San Diego, CA, USA

Language: English **Document Type:** Conference Paper (PA); Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: This paper describes the design and implementation of a surface **micromachined accelerometer** for measuring very high levels of acceleration (up to 50,000 G). Both the mechanical and electronic portions of the sensor were integrated on a single substrate using a process developed at Sandia National Laboratories. In this process, the mechanical components of the sensor were first fabricated at the bottom of a trench etched into the wafer substrate. The trench was then filled with oxide and sealed to protect the mechanical components during subsequent microelectronics processing. The wafer surface was then planarized in preparation for CMOS processing using Chemical Mechanical Polishing (CMP). Next, the CMOS electronics were fabricated on areas of the wafer adjacent to the embedded structures. Finally, the mechanical structures were released and the sensor tested. The mechanical structure of the sensor consisted to two polysilicon plate masses suspended by multiple springs (cantilevered beam structures) over corresponding polysilicon plates fixed to the substrate to form two parallel plate capacitors. The first polysilicon plate mass was suspended using compliant springs (cantilever beams) and acted as a variable capacitor during **sensor acceleration**. The second polysilicon plate mass was suspended using very stiff springs and acted as a fixed capacitor during **acceleration**. **Acceleration** was **measured** by **comparing** the **capacitance** of the variable capacitor (compliant suspension) with the fixed capacitance (stiff suspension). (5 Refs)

Subfile: A B
Descriptors: accelerometers; CMOS integrated circuits; integrated circuit technology; micromachining; microsensors
Identifiers: high G **MEMS accelerometer**; **MEMS** integrated **accelerometer**; surface **micromachined accelerometer**; wafer substrate; CMOS processing; chemical mechanical polishing; CMP; embedded structures; polysilicon plate masses; cantilevered beam structures; parallel plate capacitors; compliant springs
Class Codes: A0630G (Velocity, acceleration and rotation measurement); B7230 (Sensing devices and transducers); B7320E (Velocity, acceleration and rotation measurement); B2575 (Micromechanical device technology); B2570D (CMOS integrated circuits)

23/9/4 (Item 4 from file: 2) **Links**
INSPEC

07000817 **INSPEC Abstract Number:** A9819-0670-001, B9810-7230-004, C9810-3240D-002
Title: An area-variable capacitive microaccelerometer with force-balancing electrodes
Author Byeoungju Ha; Byeungleul Lee; Sangkyung Sung; Sangon Choi; Meenam Shinn; Yongsoo Oh; Cimoo Song

Author Affiliation: Micro Syst. Lab., Samsung Adv. Inst. of Technol., Suwon, South Korea
Journal: Proceedings of the SPIE - The International Society for Optical Engineering **Conference Title:** Proc. SPIE - Int. Soc. Opt. Eng. (USA) vol.3242 p. 181-90
Publisher: SPIE-Int. Soc. Opt. Eng ,
Publication Date: 1997 **Country of Publication:** USA
CODEN: PSISDG **ISSN:** 0277-786X
SICI: 0277-786X(1997)3242L.181:AVCM;1-Q
Material Identity Number: C574-98007
U.S. Copyright Clearance Center Code: 0277-786X/97/$10.00
Conference Title: Smart Electronics and MEMS
Conference Sponsor: SPIE: Univ. South Australia; Microelectron. Centre; Defense Sci. & Technol. Organ
Conference Date: 11-13 Dec. 1997 **Conference Location:** Adelaide, SA, Australia

Language: English **Document Type:** Conference Paper (PA); Journal Paper (JP)
Treatment: Practical (P); Experimental (X)
Abstract: A surface **micromachined accelerometer** which senses an inertial motion with an area variation and a force balancing electrodes is developed. The grid-type planar mass of a 7 mu m thick polysilicon is supported by four thin beams and suspended above a silicon substrate with a 1.5 mu m air gap. The motion sensing electrodes are formed on the substrate. The sensor is designed as an interdigital rib structure that has a differential capacitor arrangement. The moveable electrodes are mounted on the mass and the pairs of the **stationary electrodes** are patterned on the substrate. In the **accelerometer** that has **comb**-type **movable electrodes**, the mechanical stress and the electrical pulling effects between a moveable **electrodes** and the **fixed electrodes** occur. However this grid-type structure can have a large area variation in a small area relatively without stress and pulling, high sensitivity can be achieved. In order to improve the dynamic range and a linearity, a pair of **comb shape** force-balancing electrodes are implemented on both sides of the mass. The force-balancing electrodes are made of the same layer as the mass and anchored on a silicon substrate. When acceleration is applied in the lateral direction, the difference of capacitance results from the area variation between the two capacitors and is measured using a charge amplifier. As AC coupled complimentary pick-off signals are applied in pairs of **stationary electrodes**, the undesirable effects due to temperature and electrical noise are reduced effectively. The **accelerometer** has a sensitivity of 28mV/g and a bandwidth of DC-120 Hz. A resolution of 3 mg and a nonlinearity of 1.3% is achieved for a measurement range of +or-9 g. (8 Refs)
Subfile: A B C
Descriptors: accelerometers; capacitance measurement; capacitors; closed loop systems; electric sensing devices; elemental semiconductors; feedback; frequency response; microelectrodes; micromachining; **micromechanical** resonators; microsensors; motion control; position control; silicon
Identifiers: area-variable capacitive microaccelerometer; force-balancing electrodes; surface **micromachined accelerometer**; inertial motion sensing; grid-type planar mass; polysilicon; thin beams; motion sensing electrodes; interdigital rib structure; **comb**-type **movable electrodes**; dynamic range; linearity; difference of capacitance; sensitivity; **MEMS**; force feedback; resonant **accelerometer**; rebalancing control loop; closed control loop system; capacitive position detection; feedback controller; frequency response; 7 micron; Si

23/9/3 (Item 3 from file: 2) **Links**
INSPEC

07026613 **INSPEC Abstract Number:** B9810-7230-078
Title: A area variable capacitive microaccelerometer with force-balancing electrodes
Author Byeoungju Ha; Yongsoo Oh; Byeungleul Lee; Park, K.Y.; Seongsoon Baek; Seoungdo Ann; Cimoo Song; Janggyu Lee
Author Affiliation: Microsyst. Lab., Samsung Electro Mech. Co., Suwon, South Korea
Conference Title: IEEE 1998 Position Location and Navigation Symposium (Cat. No.98CH36153) p. 146-51
Publisher: IEEE , New York, NY, USA
Publication Date: 1998 **Country of Publication:** USA 655 pp.
ISBN: 0 7803 4330 1 **Material Identity Number:** XX98-01047
U.S. Copyright Clearance Center Code: 0 7803 4330 1/98/$10.00
Conference Title: IEEE 1998 Position Location and Navigation Symposium
Conference Sponsor: IEEE; Aerosp. & Electron. Syst. Soc
Conference Date: 20-23 April 1998 **Conference Location:** Palm Springs, CA, USA

Language: English **Document Type:** Conference Paper (PA)
Treatment: Applications (A); Practical (P); Experimental (X)
Abstract: A surface **micromachined accelerometer** which senses a inertial motion with an area variation is developed. The grid-type planar mass of 7 mu m thick polysilicon is supported by four thin beams and suspended above a Si substrate with a 1.5 mu m air gap. The motion sensing electrodes are formed on the substrate. The **accelerometer** is designed as an interdigital rib structure that has a differential capacitor arrangement. The **movable electrodes** are mounted on the mass and the pairs of the **stationary electrodes** are patterned on the substrate. In the **accelerometer** that has **comb**-type **movable electrodes**, the mechanical stress and the electrical pulling effects between a **movable electrodes** and the **fixed electrodes** occur. However this grid-type structure can have a large area variation in a small area relatively without stress and pulling, high sensitivity can be achieved. In order to improve the dynamic range and a linearity, a pair of **comb shape** force-balancing electrodes are implemented on both sides of the mass. The force-balancing electrodes are made of the same layer as the mass and anchored on a Si substrate. When acceleration is applied in the lateral direction, the difference of capacitance results from the area variation between the two capacitors and is measured using a charge amplifier. The **accelerometer** has a sensitivity of 95 mV/g and a bandwidth of DC~1 kHz. A resolution of 3 mg and a non-linearity of 0.1%(F.S) is achieved for a measurement range of +or-5 g. (8 Refs)
Subfile: B
Descriptors: accelerometers; capacitance measurement; microelectrodes; micromachining; microsensors; sensitivity; silicon
Identifiers: area variable capacitive microaccelerometer; force-balancing electrodes; surface **micromachined accelerometer**; inertial motion sensing; grid-type planar mass; polysilicon; Si substrate; motion sensing electrodes; interdigital rib structure; differential capacitor arrangement; **comb**-type **movable electrodes**; high sensitivity; **comb shape** force-balancing electrodes; dynamic range; linearity; charge amplifier; 1 kHz; 1.5 micron; Si
Class Codes: B7230 (Sensing devices and transducers); B2575 (Micromechanical device technology); B7320E (Velocity, acceleration and rotation measurement)
Chemical Indexing:
Si sur - Si el (Elements - 1)
Numerical Indexing: bandwidth 1.0E+03 Hz; size 1.5E-06 m

10/26/2005 2:44:14 PM

[File 324] German Patents Fulltext 1967-200542
[File 344] Chinese Patents Abs Aug 1985-2005/May
[File 347] JAPIO Nov 1976-2005/Jun(Updated 051004)
[File 350] Derwent WPIX 1963-2005/UD,UM &UP=200568

Set	Items	Description
S1	64752	S ACCELEROMETER? ? OR ACCELERAT????(2N)(SENS???? OR MEASUR?????) OR MEMS OR MICROMACHINE? ? OR MICROELECTROMECHANICAL? ? OR MICRO()ELECTROMECHANICAL? ? OR MICROELECTRO()MECHANICAL? ? OR MICRO()MECHANICAL? ? OR MICROMECHANICAL? ? OR VIBROMETER? ? OR VIBRO()METER? ? OR VIBRAT????(2N)(MEASUR???? OR SENS????) OR GRAVIMETER? ?
S2	129932	S CAPACITANCE(3N)MEASUR???? OR ELECTRIC(2N)(CAPACIT???? OR REACTANCE? ?) OR CAPACIT????(2N)STOR???? OR SUPERCAPACITANCE? ? OR SUPER()CAPACITANCE OR INDUCTANCE? ?
S3	5440823	S COMPENSAT???? OR CORRECT??? OR ADJUST???? OR ERROR()CORRECT???? OR RECALIBRAT???? OR REGULAT???? OR COMPAR???? OR PRECISION OR DIFFERENTIAT???? OR ERROR? ?
S4	102370	S (MOVABLE OR MOTIL???? OR MOBIL???? OR MOTIVE OR MOTILE OR ACTIV???? OR AGITAT???)(3N)(ELECTRODE? ? OR CONDUCT???? OR ROD? ? OR ANODE? ? OR CATHODE? ? OR PROB??? OR SENS????)
S5	116273	S (FIXED OR STATIONARY OR IMMOV???? OR IMMOB???? OR STATIC???? OR MOTIONLESS OR RIGID??? OR STABLE OR PERMANENT OR IMMOTIL?????)(3N)(ELECTRODE? ? OR CONDUCT???? OR ROD? ? OR ANODE? ? OR CATHODE? ? OR PROB??? OR SENS????)
S6	168114	S (COMPENSAT???? OR CORRECT??? OR ADJUST???? OR ERROR()CORRECT???? OR RECALIBRAT???? OR REGULAT???? OR COMPAR???? OR PRECISION OR DIFFERENTIAT???? OR ERROR? ?)(3N)(ELECTRODE? ? OR CONDUCT???? OR ROD? ? OR ANODE? ? OR CATHODE? ? OR PROB??? OR SENS????)
S7	2286188	S FINGER???? OR COMBSHAPE? ? OR COMB()SHAPE? ? OR INTERCALAT???? OR INSERT????()BETWEEN OR COMB? ? OR FORK()SHAPE OR PROJECT???? OR FORK? ? OR COMBLIKE OR COMB()LIKE OR FORKLIKE OR FORK()LIKE OR ARM? ? OR EXTENSION? ?
S8	614	S COMPAR????(3N)CAPACITANCE? ?
S9	23787	S IC=(G01P-015/125 OR B81B-003/00 OR G01D-005/24 OR G01P-015/08 OR G01P-021/00 OR H01L-029/84 OR G01P-001/02 OR G01P-015/13)
S10	34971	S MC=(S02-B07A OR S02-G03 OR W06-A07 OR X22-C02C3 OR X22-J07 OR X22-X06B OR S02-K03A1C OR U12-B03F1A OR V06-L03 OR V06-E06 OR V06-L03 OR S02-B OR U12-B03E)
S11	1	S S1 AND S2 AND S3 AND S4 AND S5 AND S6 AND S7
S12	158	S S2 AND S3 AND S4 AND S5
S13	16	S S12 AND S9
S14	7	S S12 AND S10
S15	16	S S13 AND PY<=2003
S16	7	S S14 AND PY<=2003
S17	615	S S4 AND S5 AND S6 AND S7
S18	0	S S17 AND S8
S19	69	S S17 AND S1
S20	29	S S19 AND S9
S21	1	S S19 AND S10
S22	24	S S20 AND PY<=2003
S23	26	S S17 AND S2 AND S3
S24	5051	S S2(3N)S3
S25	0	S S17 AND S24
S26	23	S S23 AND PY<=2003
S27	7	S S14 NOT S11
S28	1	S S21 NOT (S11 OR S14)
S29	11	S S15 NOT (S11 OR S14 OR S21)
S30	24	S S22 NOT S26
S31	0	S S30 AND FLOAT????(3N)MASS
S32	0	S S30 AND SUSPEND???(3N)MASS
S33	22	S S26 NOT (S11 OR S14 OR S15 OR S21 OR S22)

22/9/24 (Item 1 from file: 347) **Links**
JAPIO

03262868 **Image available**
ACCELERATION SENSOR

Pub. No.: 02-238368 [JP 2238368 A]
Published: September 20, 1990 (**19900920**)
Inventor: HASEGAWA HIROSHI
Applicant: TOUPURE KK [326949] (A Japanese Company or Corporation), JP (Japan)
Application No.: 01-060294 [JP 8960294]
Filed: March 13, 1989 (19890313)
International Class: [5] **G01P-015/125**; G01P-015/00
JAPIO Class: 46.1 (INSTRUMENTATION -- Measurement); 26.2 (TRANSPORTATION -- Motor Vehicles); 37.2 (SAFETY -- Traffic)
JAPIO Keyword: R131 (INFORMATION PROCESSING -- Microcomputers & Microprocessers)
Journal: Section: P, Section No. 1141, Vol. 14, No. 558, Pg. 37, December 12, 1990 (19901212)

ABSTRACT
PURPOSE: To obtain an **acceleration sensor** which is not affected by noise substantially and is highly reliable by providing a means of extracting the amount of movement of a weight as the amount of change in electrostatic capacity, a means of converting the amount of change into a frequency, a means of detecting the contact of **movable** and **fixed electrodes** and a means of outputting a signal when the result of detection and the frequency are prescribed values or below.

CONSTITUTION: A weight 14a of a sensor 1 moves onto the lower side at the time of collision, an electrostatic capacity between a spring 12a and an electrode 10a increases and an oscillation frequency of an inverter 21 lowers. When it lowers to a prescribed frequency or below, an acceleration is determined as the maximum, while judgement is made as collision from the contact of a conductor 12c with a **comb-shaped** electrode 10b, and an ON signal is sent to main CPU. In the absence of the ON signal, no collision signal is delivered even when there is noise. At the time of ordinary running, the oscillation frequency of the inverter 21 is sent as a monitor signal to the main CPU, the acceleration is computed, and when it is a prescribed set value (about 1G), it is determined as normal. According to this constitution, it can be checked up whether or not the **sensor** operates **correctly** in case of emergency, and thus the **acceleration sensor** which is not affected by noise substantially and is highly reliable is obtained.

29/9/11 (Item 1 from file: 350) **Links**
Derwent WPIX

015269224 **Image available**
WPI Acc No: 2003-330153/**200331**
XRPX Acc No: N03-264262

Characteristic measurement method for capacitive type sensor, involves applying two different voltages across movable and fixed electrodes while measuring electro static capacitance of electrodes

Patent Assignee: DENSO CORP (NPDE); NIPPONDENSO CO LTD (NPDE); TOYOTA CHUO KENKYUSHO KK (TOYW); FUNAHASHI H (FUNA-I); ISHIO S (ISHI-I); ITO H (ITOH-I); MAKINO Y (MAKI-I); OHTA N (OHTA-I); SHIMAOKA K (SHIM-I); SUZUKI Y (SUZU-I)

Inventor: FUNAHASHI H; ISHIO S; ITO H; MAKINO Y; OHTA N; SHIMAOKA K; SUZUKI Y

Number of Countries: 003 Number of Patents: 004

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
US 20030011384	A1	20030116	US 2002189599	A	20020708	200331	B
DE 10231153	A1	20030227	DE 10231153	A	20020710	200331	
JP 2003028825	A	20030129	JP 2001211098	A	20010711	200331	
US 6809527	B2	20041026	US 2002189599	A	20020708	200470	

Priority Applications (No Type Date): JP 2001211098 A 20010711

Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
US 20030011384	A1		13	G01R-027/26	
DE 10231153	A1			G01D-005/24	
JP 2003028825	A		11	G01N-027/22	
US 6809527	B2			G01R-027/26	

Abstract (Basic): US 20030011384 A1

NOVELTY - Two different voltages are applied between **fixed** and **movable electrodes** (108a,108b) to **measure** the **capacitance** across the electrodes. The capacitance of capacitor (110) is measured and **compared** with electro **static** capacitance of **electrodes**. The characteristics of sensor is estimated based on the **comparison** results.

DETAILED DESCRIPTION - INDEPENDENT CLAIMS are included for the following:

(1) sensor characteristic measuring apparatus;

(2) capacitive type sensor; and

(3) integrated circuit chip

USE - For measuring characteristics of capacitive type sensor like pressure/inertia/vibration/sound pressure sensor.

ADVANTAGE - Ensures precise measurement by increasing contact area of **movable** and **fixed electrodes**.

DESCRIPTION OF DRAWING(S) - The figure shows a block diagram of

sensor characteristics measuring apparatus.
fixed and **movable electrodes**
(108a,108b)
capacitor (110)
pp; 13 DwgNo 2/4
Title Terms: CHARACTERISTIC; MEASURE; METHOD; CAPACITANCE; TYPE; SENSE; APPLY; TWO; VOLTAGE; MOVE; FIX; ELECTRODE; MEASURE; ELECTRO; STATIC; CAPACITANCE; ELECTRODE
Derwent Class: S01; S02
International Patent Class (Main): **G01D-005/24**; G01N-027/22; G01R-027/26
File Segment: EPI
Manual Codes (EPI/S-X): S01-D05A3; S01-G12C; S02-K07

27/9/7 (Item 7 from file: 350) **Links**
Derwent WPIX

009869885 **Image available**
WPI Acc No: 1994-149780/199418
XRPX Acc No: N94-117551

Capacitive-type pressure sensor operating in unstable temp condition - has membrane to move movable electrode of measuring capacitor and used reference capacitor to compensate effect of external factors

Patent Assignee: PHYS MEASUREMENTS RES INST (PHYS-R)
Inventor: BELOZUBOV E M
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
SU 1800299	A1	19930307	SU 4683291	A	19890425	199418	B

Priority Applications (No Type Date): SU 4683291 A 19890425
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
SU 1800299	A1		4	G01L-009/12	

Abstract (Basic): SU 1800299 A

A **movable electrode** (4) of a measuring capacitor is placed on the surface of a membrane, while the circular **fixed electrode** (5) of a reference capacitor is placed on a support base. The membrane moves the **movable electrode** (4) during action of pressure, changing the **capacitance** of the **measuring** capacitor in proportion. Action of external factors affects the measuring and reference capacitors and is **compensated**.

USE/ADVANTAGE - For measuring of static or dynamic pressure influenced by unstable temp condition. Better measuring accuracy of rapidly-changing pressure. Bul.9/7.3.93

Dwg.1/3

Title Terms: CAPACITANCE; TYPE; PRESSURE; SENSE; OPERATE; UNSTABLE; TEMPERATURE; CONDITION; MEMBRANE; MOVE; MOVE; ELECTRODE; MEASURE; CAPACITOR; REFERENCE; CAPACITOR; **COMPENSATE**; EFFECT; EXTERNAL; FACTOR
Derwent Class: S02
International Patent Class (Main): G01L-009/12
File Segment: EPI
Manual Codes (EPI/S-X): S02-F04B2; **S02-K03A1C**

27/9/6 (Item 6 from file: 350) **Links**
Derwent WPIX

011717136 **Image available**
WPI Acc No: 1998-134046/199813
XRPX Acc No: N98-105889

Oscillation sensor for measuring electrostatic-capacitance variation of fixed and movable electrodes - has impact application device which applies impact oscillation to weight with high intrinsic frequency provided on reverse side of fixed electrode so that movable electrode might move during oscillation

Patent Assignee: MATSUSHITA ELECTRIC WORKS LTD (MATW)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 10009944	A	19980116	JP 96164203	A	19960625	199813	B

Priority Applications (No Type Date): JP 96164203 A 19960625
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 10009944	A		5	G01H-011/06	

Abstract (Basic): JP 10009944 A

The sensor has a weight (4) provided on the reverse side of a **fixed electrode** (1) so that a **movable electrode** (2) might move during oscillation. The **movable electrode**, with both ends supported, approaches the **fixed electrode** at predetermined space. An electric film (3), with electric-charge surface (31) which is **fixed** to the **movable electrode** and holds electric charge, approaches the **fixed electrode**. Impact oscillation is applied by an impact application device (5) to the weight which has a high intrinsic frequency **compared** with the frequency to detect.

The impact application device has a spring (51) whose one is fixed. An impact load (52) is connected to the other end of the spring and moved by the loaded condition of oscillation.

ADVANTAGE - **Measures** electrostatic-**capacitance** variation between electrodes by detecting oscillation. Operation of sensor is stabilised even when it detects low-frequency oscillation. Enables cost reduction by using thin **movable electrode**.

Dwg.1/7

Title Terms: OSCILLATING; SENSE; MEASURE; ELECTROSTATIC; CAPACITANCE; VARIATION; FIX; MOVE; ELECTRODE; IMPACT; APPLY; DEVICE; APPLY; IMPACT; OSCILLATING; WEIGHT; HIGH; INTRINSIC; FREQUENCY; REVERSE; SIDE; FIX; ELECTRODE; SO; MOVE; ELECTRODE; MOVE; OSCILLATING

27/9/5 (Item 5 from file: 350) **Links**
Derwent WPIX

012768553 **Image available**
WPI Acc No: 1999-574776/199949
XRPX Acc No: N99-423945

Semiconductor capacitance type multi-axis acceleration sensor for seismoscope - has beam for supporting movable electrode which is connected to fixed position within periphery enclosure of movable electrode

Patent Assignee: OMRON KK (OMRO)
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 11248738	A	19990917	JP 9863911	A	19980302	199949	B

Priority Applications (No Type Date): JP 9863911 A 19980302
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 11248738	A		10	G01P-015/125	

Abstract (Basic): JP 11248738 A

NOVELTY - A beam (16) is provided for supporting a **movable electrode** (15) such that end of the beam is movably connected to a fixed position within by the enclosed periphery of the **movable electrode**. DETAILED DESCRIPTION - A **fixed electrode** (17) is arranged on a fixed substrate (11). The **movable electrode** (15) is arranged opposite to the **fixed electrode** with space inbetween, so that the **movable electrode** inclines towards the **fixed electrode** due to capacitance variation.

USE - Used for seismoscope, motor vehicle, gas meter, elevator,etc.

ADVANTAGE - Since the signal for **measuring** electrostatic **capacitance** is larger than noise, high **precision** measurement of acceleration is possible. Sensitivity of sensor is improved since area of **movable electrode** is larger and hence electrostatic capacitance.

DESCRIPTION OF DRAWING(S) - The figure shows the structure of the semiconductor capacitance type multi-axis acceleration sensor and the shape of the **movable electrode** and of beam.

(11) Substrate; (15) **Movable electrode**; (16) Beam; (17) **Fixed electrode**.

Dwg.1/11

Title Terms: SEMICONDUCTOR; CAPACITANCE; TYPE; MULTI; AXIS; ACCELERATE; SENSE; SEISMIC; BEAM; SUPPORT; MOVE; ELECTRODE; CONNECT; FIX; POSITION; PERIPHERAL; ENCLOSE; MOVE; ELECTRODE
Derwent Class: S02; U12
International Patent Class (Main): G01P-015/125

27/9/2 (Item 2 from file: 350) **Links**
Derwent WPIX

014675527 **Image available**
WPI Acc No: 2002-496231/200253
XRPX Acc No: N02-392795

Earthquake detector in governor chamber of gas supply system, has memory in which relationship of output and input of capacitive sensor, is stored

Patent Assignee: TOKYO GAS CO LTD (TOLG); YAMATAKE HONEYWELL CO LTD (HONF)
Number of Countries: 001 Number of Patents: 002
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week	
JP 2002162413	A	20020607	JP 2000356501	A	20001122	200253	B
JP 3440075	B2	20030825	JP 2000356501	A	20001122	200357	

Priority Applications (No Type Date): JP 2000356501 A 20001122
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 2002162413	A		9	G01P-015/125	
JP 3440075	B2		9	G01P-015/125	Previous Publ. patent JP 2002162413

Abstract (Basic): JP 2002162413 A

NOVELTY - A capacitive **sensor** (30) has a fixed **electrode** and a **movable electrode** that moves depending on input. A judgment circuit (62) judges the output of the **capacitive** sensor and **stores** the relationship of output and input of capacitive sensor, in a memory.

USE - For governor chamber in gas supply system.

ADVANTAGE - The airtight variation of capacitive sensor is detected **correctly**.

DESCRIPTION OF DRAWING(S) - The figure shows the block diagram of gas supply system. (Drawing includes non-English language text).

Capacitive sensor (30)

Judgment circuit (62)

pp; 9 DwgNo 1/10

Title Terms: EARTHQUAKE; DETECT; GOVERNOR; CHAMBER; GAS; SUPPLY; SYSTEM; MEMORY; RELATED; OUTPUT; INPUT; CAPACITANCE; SENSE; STORAGE
Derwent Class: S02; S03
International Patent Class (Main): G01P-015/125
International Patent Class (Additional): G01H-001/00; G01P-021/00; G01V-001/00; G01V-001/18
File Segment: EPI
Manual Codes (EPI/S-X): S02-E; **S02-G03**; S03-C01; S03-C01B